# User Manual

## -Installation

## -Operation

**Omniksol-1.5k-TL**

**Omniksol-2k-TL**

Omnik New Energy Co.,ltd.

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# 1. NOTES ON THIS MANUAL

## 1.1 Scope of Validation

The main purpose of this User's Manual is to provide instructions and detailed procedures for installing, operating, maintaining, and troubleshooting the following two types of Omnik New Energy-Solar Inverters:

- Omniksol-1.5k-TL
- Omniksol-2k-TL

Please keep this user manual all time available in case of emergency.

## 1.2 Symbols Used

**DANGER**

**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING**

**WARNING** indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.



**CAUTION**

**CAUTION** indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.or moderate injury.

**NOTICE**

**NOTICE** indicates a situation that can result in property damage, if not avoided.

## 1.3 Target Group

- Chapter 1, 2, 3, 4, 7, 8, 9, 10, 11 and Chapter 12 are intended for anyone who is intended to use Omnik Grid Tie Solar Inverter. Before any further action, the operators must

first read all safety regulations and be aware of the potential danger to operate high-voltage devices. Operators must also have a complete understanding of this device's features and functions.

**WARNING**

Do not use this product unless it has been successfully installed by qualified personnel in accordance with the instructions in Chapter 5, "Installation".

Chapter 5 and Chapter 6 are only for qualified personnel who are intended to install or uninstall the Omnik Grid Tie Solar Inverter.

**NOTICE**

Hereby qualified personnel means he/she has the valid license from the local authority in:

- Installing electrical equipment and PV power systems (up to 1000 V).
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Selecting and using Personal Protective Equipment (PPE).

# 2. PREPARATION

## 2.1 Safety Instructions

### DANGER

**DANGER due to electrical shock and high voltage**

DO NOT touch the operating component of the inverter, it might result in burning or death.

TO prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are plugged out.

DO NOT stay close to the instruments while there is severe weather conditions including storm, lighting etc.

### WARNING

The installation,service ,recycling and disposal of the inverters must be performed by qualified personnel only in compliance with national and local standards and regulations. Please contact your dealer to get the information of authorized repair facility for any maintenance or repairmen.

Any unauthorized actions including modification of product functionality of any form will affect the validation of warranty service; Omnik may deny the obligation of warranty service accordingly.

### NOTICE

**Public utility only**

The PV inverter designed to feed AC power directly into the public utility power grid, do not connect AC output of the device to any private AC equipment.

**CAUTION**

The PV inverter will become hot during operation; please don't touch the heat sink or peripheral surface during or shortly after operation.

Risk of damage due to improper modifications.

Never modify or manipulate the inverter or other components of the system.

## 2.2 Explanations of Symbols on Inverter

| Symbol | Description |
|---|---|
| | **Dangerous electrical voltage**<br>This device is directly connected to public grid, thus all work to the inverter shall only be carried out by qualified personnel. |
| | **DANGER to life due to high electrical voltage!**<br>There might be residual currents in inverter because of large capacitors. Wait 10 MINUTES before you remove the front lid. |
| | **NOTICE, danger!**<br>This device directly connected with electricity generators and public grid. |
| | **Danger of hot surface**<br>The components inside the inverter will release a log of heat during operation, DO NOT touch aluminum housing during operating. |
| | **An error has occurred**<br>Please go to Part 10 “Trouble Shooting” to remedy the error. |
| | **This device SHALL NOT be disposed of in residential waste**<br>Please go to Part 9 “Recycling and Disposal” for proper treatments. |
| | **Without Transformer**<br>This inverter does not use transformer for the isolation function. |
| | **German mark of conformity**<br>The inverter complies with the requirement of the German Grid Regulations. |
| | **Certified Safety**<br>The inverter complies with the requirements of the Equipment and Product Safety Act in Europe. |
| | **Standards Association of Australian**<br>The inverter complies with the requirement of the AS4777. |
| | **CE Mark**<br>Equipment with the CE mark fulfils the basic requirements of the Guideline Governing Low-Voltage and Electromagnetic Compatibility. |
| | **No unauthorized perforations or modifications**<br>Any unauthorized perforations or modifications are strictly forbidden, if any defect or damage (device/person) is occurred, Omnik shall not take any responsibility for it. |

# 3. PRODUCT INFORMATION

## 3.1 Overview

- Industrial Layout

- Excellent Heat Elimination

- Effective Shield For DC/AC/Communication Connections

## 3.2 Major Characteristics

Omnik inverter has following characteristics which make Omnik inverter “High Efficiency, High Reliability, High Cost Effective Ratio”

- Wide DC input voltage and current ranges, enables more PV panels connected.
- Wide MPP voltage range ensure high yield under various weather conditions.
- High MPP tracking accuracy, ensure the minimum power loses during converting.
- Complete set of protection methods.

Also, following protection methods are integrated in Omnik inverter:

- Internal overvoltage
- DC insulation monitoring
- Ground fault protection
- Grid monitoring
- Ground fault current monitoring
- DC current monitoring
- Integrated DC switch (Optional)

## 3.3 Datasheet

| Type | | | Omniksol -1.5k-TL | Omniksol -2k-TL |
|---|---|---|---|---|
| **Input (DC)** | | | | |
| Max. PV-generator power | $P_{pv}$ | [W] | 1750 | 2300 |
| Max DC voltage | $V_{max(DC)}$ | [V] | 500 | |
| MPPT DC voltage range | $V_{mppt}$ | [V] | 120 - 450 | |
| Turn off DC Voltage | $V_{min(DC)}$ | [V] | 120 | |
| Max. DC current | $I_{max(DC)}$ | [A] | 18 | |
| Nominal DC current | $I_{N(DC)}$ | [A] | 14 | 16.5 |
| Number of DC connection | | | 1 | |
| DC-connection | | | Amphenol H4 | |
| Number of MPP trackers | | | 1 | |
| Turn on power | $P_{min(DC)}$ | [W] | 10 | |
| **Output (AC)** | | | | |
| Max. AC Power | $P_{max(AC)}$ | [V] | 1650 | 2200 |
| Nominal AC power | $P_{N(AC)}$ | [W] | 1500 | 2000 |
| Max. AC current | $I_{max(AC)}$ | [A] | 9.0 | 12.0 |
| Nominal AC current | $I_{N(AC)}$ | [A] | 6.5 | 8.5 |
| Power connection | | | Single phase | Single phase |
| Grid voltage range | | | According to VDE 0126-1-1, RD1663, ENEL2010,C10/11, G83/1 AS4777 | |
| Grid frequency range | | | According to VDE 0126-1-1, RD1663, ENEL2010,C10/11 ,G83/1, AS4777 | |
| Power factor | | | 0.99 (>30% of Full Load) | |
| Harmonic distortion (THD) at nominal output | | | <2% | |
| AC Connector | | | Plug-in connector | |
| **Po er consumpt on** | | | | |
| Own consumption in operation | $P_{own(AC)}$ | [W] | 30 | |
| Power consumption at night | $P_{nig(AC)}$ | [W] | 0 | |
| Power consumption at standby | $P_{std(AC)}$ | [W] | 6 | |
| **Efficiency** | | | | |
| Max. Efficiency (at 360VDC) | | | 97.4% | |
| Euro efficiency (at 360VDC) | | | 96.6% | |
| MPPT efficiency | | | 99.9% | |
| **Safety and protection** | | | | |
| Internal overvoltage protection | | | Yes | |

| | | |
|---|---|---|
| DC Insulation monitoring | | Yes |
| Earth fault protection | | Yes |
| Grid monitoring | | According to VDE 0126-1-1, RD1663, ENEL2010,C10/11 G83/1, AS4777 |
| Earth fault current monitoring | | According to VDE 0126-1-1, RD1663, ENEL2010,C10/11 G83/1, AS4777 |
| DC current monitoring | | According to VDE 0126-1-1, RD1663, ENEL2010,C10/11 G83/1, AS4777 |
| Islanding protection | | According to VDE 0126-1-1, RD1663, G83/1, AS4777 |
| **Normative reference** | | |
| CE- compliant according to | | EN 62109, EN 61000-6-1, EN 61000-6-3, EN 61000-6-2, EN 61000-6-4 EN61000-3-2, EN61000-3-3, EN61000-3-12, EN61000-3-11 |
| **Dimensions and weight** | | |
| Dimensions (WxHxD) | [mm] | 330x425x130 |
| Weight | [kg] | 13 |
| **Environmental limits** | | |
| IP protection type | | IP 65 according to IEC 60529 |
| Operating temperature range | | -20°C to +60°C |
| Relative humidity | | 0% to 98%, no condensation |
| Maximum altitude (above sea level) | [m] | 2000 |
| Noise level | [dBA] | < 40 |
| **General data** | | |
| Isolation type | | Transformerless |
| Cooling concept | | Convection |
| Housing | | Metal housing for inside and outside installation |
| Mounting information | | Wall bracket |
| LED display | | 3 |
| LCD display | | Backlight, 16 x 2 Character LCD |
| Data logger<br>Data communication interfaces | | RS485, Optional (Wi-Fi, GPRS, Ethernet) |
| Computer Communication | | RS232 as Option |
| Standard warranty | | 5 years (optional 10 years) |

# 4. PACKING CHECKLIST

## 4.1 Assembly parts

After you receive the Omnik inverter, please check if there is any damage on the carton, and then check the inside completeness for any visible external damage on the inverter or any accessories. Contact your dealer if anything is damaged or missing.

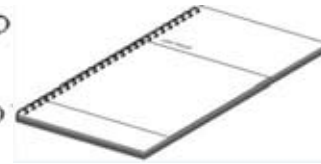
A

B

C

D

E F



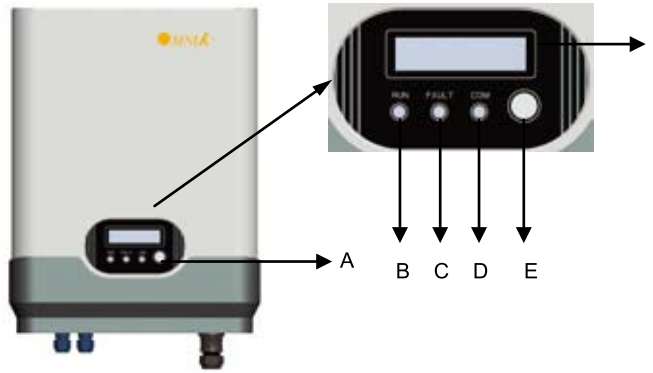
G

H

| Object | Quantity | Description |
|---|---|---|
| A | 1 | Omnik inverter |
| B | 1 pair | DC connector |
| C | 1 | AC connector |
| D | 1 | Ring tool to disconnect DC connector |
| E | 4 | Screw (ST6×50) |
| F | 4 | Expansion tube |
| G | 1 | Installation and operating instructions |
| H | 1 | DC Switch (**Optional**) |

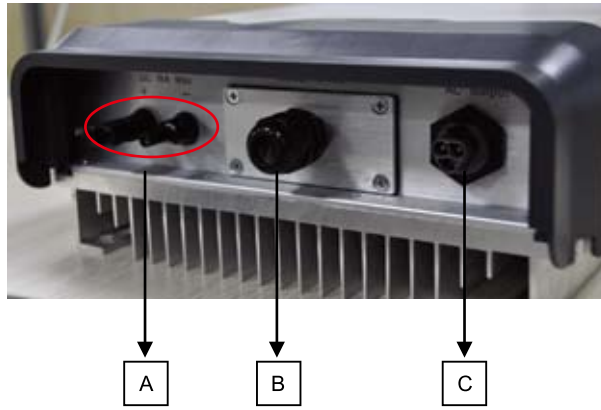
## 4.2 Product Appearance

- Front




| Object | Description |
|---|---|
| A | Removable front shield |
| B | LED light(Green) – RUN |
| C | LED light(Red) – FAULT |
| D | LED light(Yellow) – COM |
| E | Function key for displays and choice of language |
| F | Monitoring LCD with backlighting |

- Bottom



| Object | Description |
|---|---|
| A | Plug connectors for DC input. |
| B | RS232/RS485 interface |
| C | Terminal for grid connection (AC output) |

## 4.3 Product Identification

You can identify the inverter by the side name plate. Information such as serial number (SN.), type of the inverter, as well as inverter specifications are specified on the side tname plate. The name plate is on the middle part of the right side of the inverter housing. And the following figure is the side name plate example as on Omniksol-1.5k-TL.

## 4.4 Further Information

If you have any further questions concerning the type of accessories or installation, please check our website www.omnik-solar.com or contact our service hotline.

# 5. INSTALLATION

## 5.1 Safety

**DANGER**

**DANGER to life due to potential fire or electricity shock.**

**DO NOT** install the inverter near any inflammable or explosive items.

This inverter will be directly connected with HIGH VOLTAGE power generation device, the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.

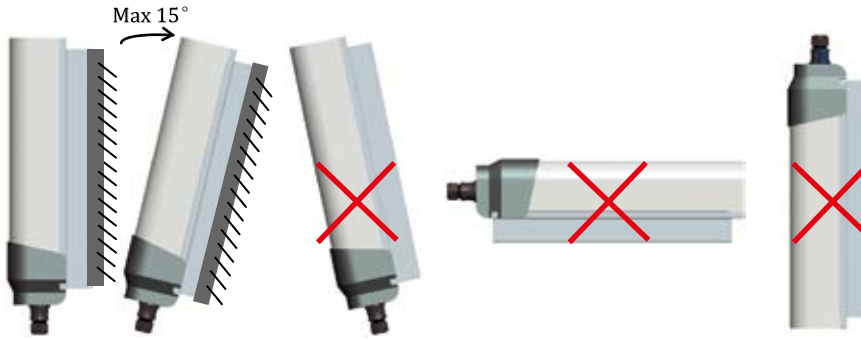
**NOTICE**

**NOTICE due to the inappropriate or the harmonized installation environment may jeopardize the life span of the inverter.**

Installation directly expose under intensive sunshine is not recommended.

The installation site MUST have good ventilation condition.

## 5.2 Mounting Instructions



- Omnik inverter is designed for indoors and outdoors installation
- Please mount the inverter in the direction as illustrated above
- Install the inverter in the vertical direction is recommended, with a max.15 degrees backwards.
- For the convenience of checking the LCD display and possible maintenance activities, please install the inverter at eye level.
- Make sure the wall you selected is strong enough to handle the screws and bear the weight of the inverter
- Ensure the device is properly fixed to the wall
- It is not recommended that the inverter is exposed to the strong sunshine, because the excess heating might lead to power reduction
- The ambient temperature of installation site should be between -20 °C and +60 °C ( between -4 °F and 140 °F )
- Make sure the ventilation of the installation spot, not sufficient ventilation may reduce the performance of the electronic components inside the inverter and shorten the life of the inverter

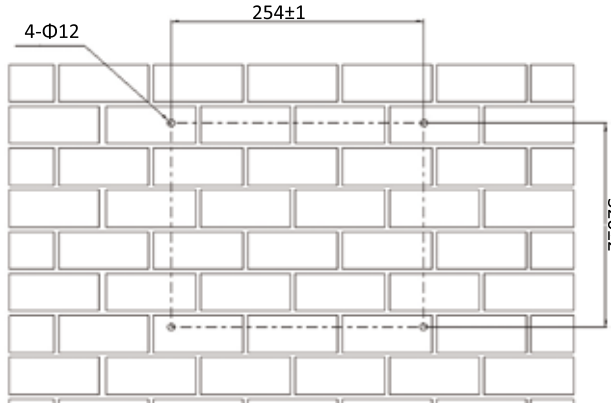
## 5.3 Safety Clearance

Observe the following minimum clearances to walls, other devices or objects to guarantee sufficient heat dissipation and enough space for pulling the electronic solar switch handle.

| Direction | Minimum Clearance |
|---|---|
| Above | 30 cm |
| Below | 30 cm |
| Sides | 10 cm |

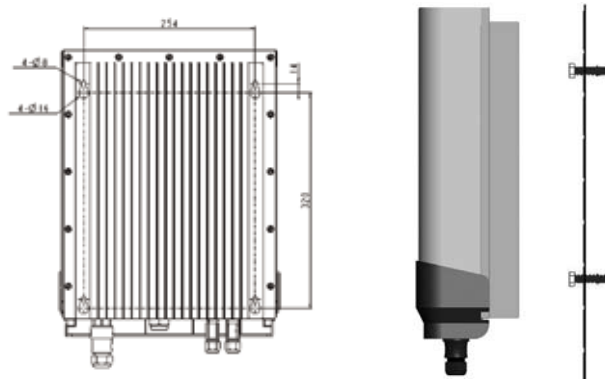
## 5.4 Mounting Procedure

1. Mark 4 positions of the drill holes on the wall according to the paper installation position scale packed in the carton box.




2. First, according to the marks, drill 4 holes in the wall. Then, place four expansion tubes in the holes using a rubber hammer. Next, wring 4 screws into the expansion tubes.

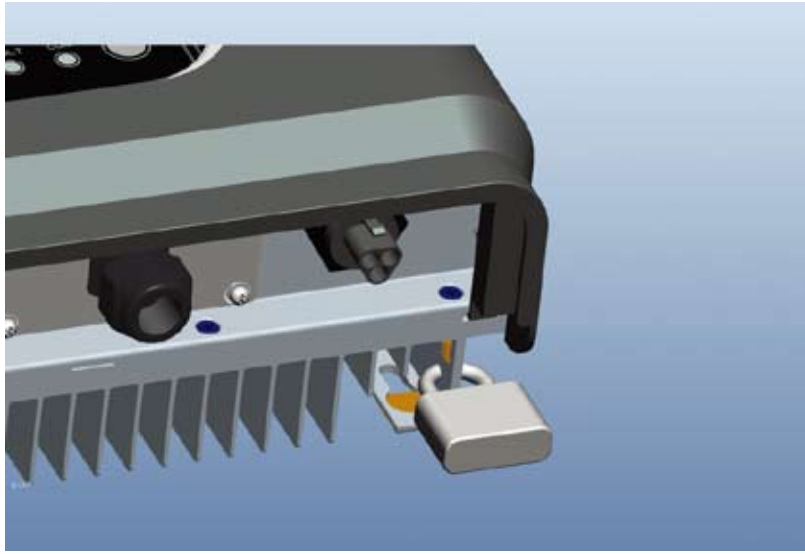
3. First check the 4 holes in the backside of the inverter. Then, lift the inverter carefully, align the 4 holes in the inverter and the 4 screws in the wall, and finally attach the inverter to the screws slightly.



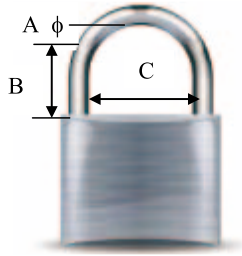
4. Please carefully check the accessories and original carton to make sure every necessary part is used and nothing is missing during installation.

## 5.5 Safety lock

To prevent possible theft activity, Omnik gives you an extra guard for your property. It is possible to lock the inverter to the rear panel with a padlock.



Recommended padlock dimension:

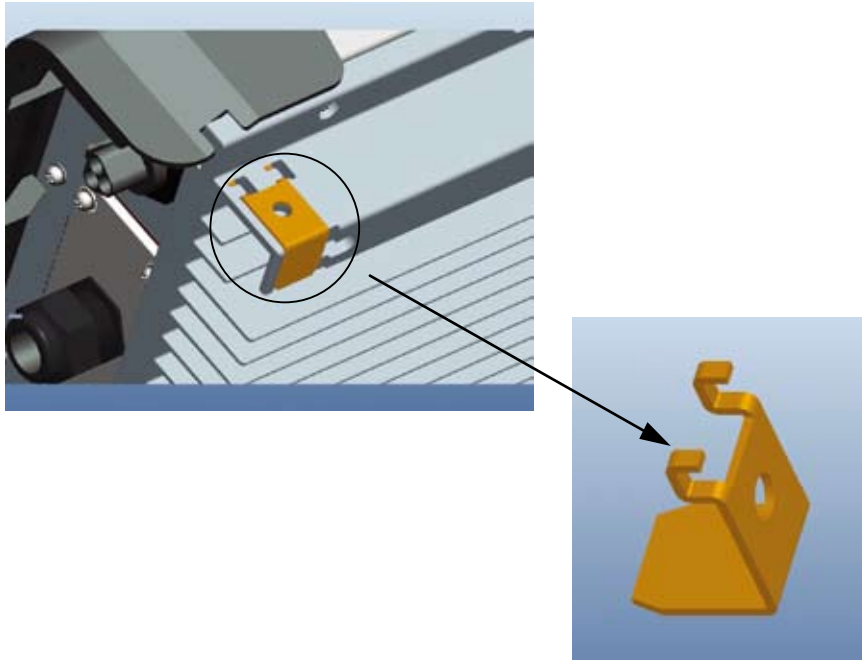



| | |
|---|---|
| A.Shackle Diameter | 5~7 mm |
| B.Vertical Clearance | 8~15 mm |
| C.Horizontal Clearance | 12~20 mm |
| Stainless, solid hanger and secured lock cylinder | |

**NOTICE**

For further maintenance and possible repair, please keep the key of the padlock in a safe place.

After the inverter is hang up on the wall, install the lock bracket on the aluminium radiator at the Lower Right Corner of the inverter (as the picture showed below),make sure the round hole of the lock bracket aim at the hole of the inverter, after that lock up the device.



The lock bracket

# 6. ELECTRICAL CONNECTION

## 6.1 Safety

**DANGER**

**DANGER to life due to potential fire or electricity shock.**

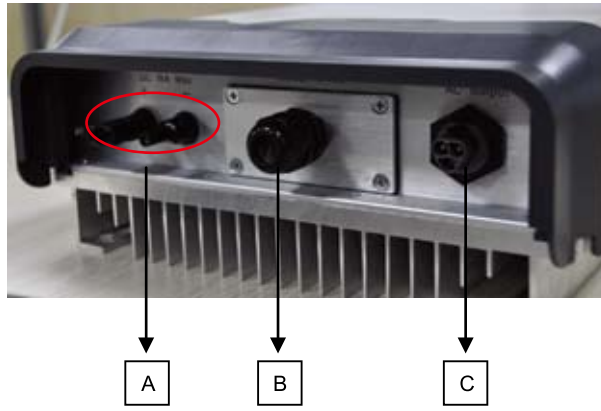
With the inverter powered, comply with all prevailing national regulations on accidents prevention.

This inverter will be directly connected with HIGH VOLTAGE power generation device, the installation must be performed by qualified personnel only in compliance with national and local standards and regulations.

**NOTICE**

Electrical connections shall be carried out in accordance with the applicable regulations, such as conductor sections, fuses, PE connection.

## 6.2 Overview of Connection Area



| Object | Description |
|---|---|
| A | Plug connectors for DC input. |
| B | RS232/RS485 interface |
| C | Terminal for grid connection (AC output) |

## 6.3 AC Side Connection

**DANGER**

**DANGER to life due to potential fire or electricity shock.**

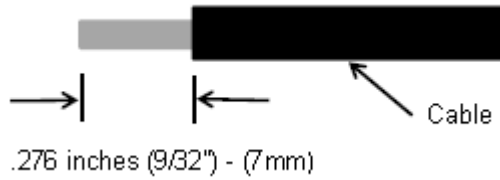
**NEVER** connect or disconnect the connectors under load.

1. Integrated RCD and RCM

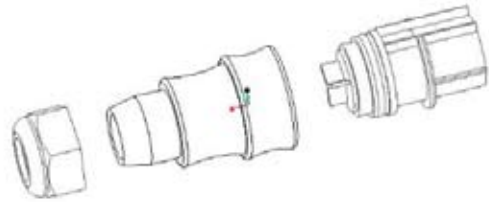
The Omniksol inverter is equipped with integrated RCD (Residual Current Protective Device) and RCM (Residual Current Operated Monitor). The current sensor will detect the volume of the leakage current and compare it with the pre-set value, if the leakage current exceeds the permitted range, the RCD will disconnect the inverter from the AC load.

2. Assembly Instructions

1) Strip the cable with the length 0.276 inches (9/32”) - (7mm) and please be careful NOT to nick conductors.



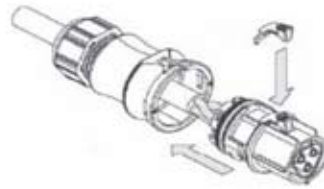

2) Screw off and separate each component of AC connector as follows.



3) Pass the cable through each component from left to the right as follows.

4) Use a screw driver and loose the three screws at the side of the straight plug. Then insert **the stripped N, L and PE cable** accordingly to the corresponding position and fully tighten the screws.

5) Aim the terminals on the straight plug to the holes of the grommet, and then compress them together.



6) Finally connect the straight plug to the AC terminal on inverter. **Pay attention to the polarity of the terminals to avoid wrong connecting.**

## 6.4 DC Side Connection

**DANGER**

**DANGER to life due to potential fire or electricity shock**

**NEVER** connect or disconnect the connectors under load.

**NOTICE**

DC Switch(**Optional**) may be integrated or external to Inverter, and it can be used to connect or disconnect the DC source from Inverter.

For Omniksol-1.5k-TL and Omniksol-2k-TL, there is only one MPP Tracker, and the DC characteristics of them are illustrated as the following table.

| Inverter Type | Max. Tracker | Max. DC Power | Max. DC Voltage | Max. DC Current |
|---|---|---|---|---|
| Omniksol-1.5k-TL | 1 | 1750W | 500V | 18A |
| Omniksol-2k-TL | | 2300W | | 18A |

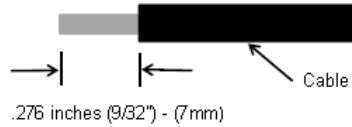
1. The DC connectors come pre-assembled and the caps are loose. The whole connector will include the male side and female side as showed below:

Female side connector (F)

Male side connector (M)

2. Assembly Instructions

a. Strip the cable with the length 0.276 inches (9/32") - (7mm) and please be careful NOT to nick conductors




b. Use specified strip tool in this step. Adjust the striper stopper and put the cable in corresponding notch to strip the length of 7mm. Please see below figures.

c. Insert striped cable into contact barrel and insure all conductor strands are captured in the contact barrel and the conductors are visible in the contact barrel observation hole. Please see below figures.

Pin contact

Barrel observation hole, conductor should be visible

Socket contact

Barrel observation hole, conductor should be visible

d. Crimp contact barrel by using the hex crimping die. Please see below figures.

Crimped pin contact

Crimped socket contact

Cable requirements:

| Cable Size | Cable pull – out force requirement |
|---|---|
| 2.5 $mm^2$ | Min. 310 N (70 Lbs) |
| 4 $mm^2$ | Min. 400 N (90 Lbs) |
| 6 $mm^2$ | Min. 450 N (100 Lbs) |

e. Insert contact cable assembly into back of male and female connector. A “click” should be heard or felt when the contact cable assembly is seated correctly. Please see below figures.

Female side connector (F)

Male side connector (M)

f. Wrest the cap by using the torque of 2.6~2.9NM.

g. Plug the DC connectors to DC terminal on Omnik-sol

## 6.5 DC Side Disconnection

When the separation of DC connectors is necessary, please use the specified tool (Ring tool or wrench tool) to separate them. While using the ring tool or wrench tool, please make sure the wedge side of the fingers faces the female connector and push the tool down. Then separate the connector by hand. See below figures.

Separation by ring tool

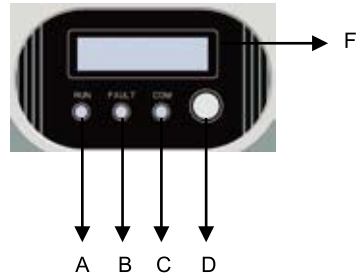
## 6.6 Communication and Monitoring Device

There are 2 plugs in the bottom side of the Omnik inverter as the following figure:

These 2 plugs are used for multipoint communications, that is, up to 50 Omnik inverters can be connected one by one through these 2 plugs and the cables, the upper computer can communicate with these inverters via a single signal cable at the same time, and maximum length of the cable is 1000m. Through these plugs, the user can get the data from these inverters, and can also configure parameters of them.

# 7. DISPLAY

## 7.1 LCD Panel




| Object | Description |
|---|---|
| A | LED light(Green) – RUN |
| B | LED light(Red) – FAULT |
| C | LED light(Yellow) – COM |
| D | Function key for displays and choice of language |
| E | Monitoring LCD with backlighting |

The LCD panel is integrated in the front lid of the inverter, so it is easy for user to check and set the data. In addition, the user can press the function key to illuminate the LCD screen.

**NOTICE**

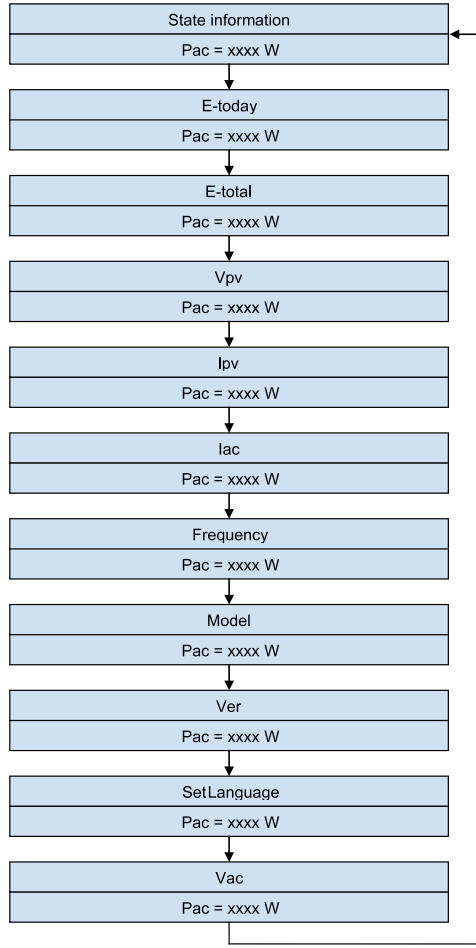
Omnik inverter is not an aligned measuring instrument for current, voltage or power consumption. A slight deviation of a few percent points is intrinsic to the system, the results from the inverter cannot be used for grid balance calculations. An aligned meter will be required to make calculations for the utility company.

## 7.2 LCD Display

**NOTICE**

Make sure the DC switch(**Optional**) is switched to “On” position, otherwise the inverter cannot work due to power shortage.

The display content consists of 2 lines. The bottom line (Line 2) always displays the output power (Pac = xxxx W). The top line (Line 1) shows current state information by default, and by pressing function key it will display different operating information as the following flow chart and table.



| Line 1 | Description |
|---|---|
| State information | Current state information: all possible content shows in the following table, reference to 7.4 for further information |
| E-today | The energy generated today in kilo watt hours (kWh) |
| E-total | The energy generated since starting up the inverter (kWh) |
| Vpv | The present voltage of the solar generator |
| Ipv | The present current of the solar generator |
| Iac | The present grid current |
| Frequency | The grid frequency |
| Model | The type of the inverter |
| Ver | The Firmware version |
| Set Language | Several languages are provided for users, reference to 7.3 for further information |
| Vac | The grid voltage |

## 7.3 Set Language

The Omnik inverter provides several languages for users to use. At the entry of “Set Language”, press the key for approx. 5 seconds, you can enter the language selection menu. Choose the language which you need with the function key, and keep this state without any operation. When it returns to the main menu automatically, the setting has been saved.

## 7.4 State Information

| State | Display | State information |
|---|---|---|
| Wait | Waiting | Initialization & waiting |
| | Reconnect s | Reconnect |
| | Checking s | Checking |
| Normal | Normal | Normal state |
| Fault | Ground I Fault | GFCI failure oversized leakage current |
| | Fac Failure | Grid frequency failure |
| | Vac Failure | Grid voltage failure |
| | Utility Loss | No Utility&Island |
| | PV Over Voltage | Input voltage too high |
| | Over Temperature | Temperature abnormal |
| | Isolation Fault | Isolation failure |
| | Relay-Check Fail | Output relay failure |
| | DC INJ High | Output DC injection too high |
| | EEPROM R/W Fail | EEPROM problem |
| | SCI Failure | Serial communication interface failure |
| | AC HCT Failure | Output AC sensor abnormal |
| | GFCI Failure | GFCI testing device abnormal |
| Flash | F/W Updating | Update |

About the further information for each fault, please reference to chapter "9. TROUBLESHOOTING".

# 8. RECYCLING AND DISPOSAL

To comply with European Directive 2002/96/EC on waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer required must be returned to your dealer or you must find an approved collection and recycling facility in your area.

Ignoring this EU Directive may have severe affects on the environment and your health.

**WARNING**

**This device SHALL NOT be disposed of in residential waste.**

# 9. TROUBLESHOOTING

| | LCD display | Possible actions |
|---|---|---|
| **Resumable Fault** | Isolation Fault | 1. Check the impedance between PV (+) & PV (-) and the inverter is earthed. The impedance must be greater than 2MΩ.<br>2. Check whether the AC-side has contacts with earth. |
| | Ground I Fault | 1. The ground current is too high.<br>2. After cut off the AC side connection, unplug the inputs from the PV generator and check the peripheral AC system.<br>3. After the cause is cleared, re-plug the PV panel and AC connection, and check PV-Inverter status. |
| | Grid Fault<br>Fac Over Range<br>Vac Over Range | 1. Wait for a moment, if the grid returns to normal, PV-Inverter automatically restarts.<br>2. Make sure grid voltage and frequency meet the specifications. |
| | Utility Loss | 1. Grid is not connected.<br>2. Check grid connection cables.<br>3. Check grid usability.<br>4. If grid is ok, and the problem persists, maybe the fuse in the inverter is open, please call service. |
| | Over Temperature | 1. The internal temperature is higher than specified normal value.<br>2. Find a way to reduce the ambient temperature.<br>3. Or move the inverter to a cooler environment. |
| | PV over Voltage | 1. Check the open PV voltage, see if it is greater than or too close to 500VDC (for Omniksol-1.5k-TL or Omniksol-2k-TL).<br>2. If PV voltage is less than 500VDC, and the problem still occurs, please call local service. |
| **Permanent Fault** | Consistent Fault | Disconnect PV (+) or PV (-) from the input, restart the inverter. |
| | Relay-Check Fail<br>DC INJ High<br>EEPROM R/W<br>Fail<br>SCI Failure<br>AC HCT Fault<br>GFCI Failure | 1. Disconnect ALL PV (+) or PV (-).<br>2. Wait for a few seconds.<br>3. After the LCD switches off, reconnect and check again.<br>4. If the problems remain please call local service. |

# 10. CONTACT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# 11. ABBREVIATION

| | |
|---|---|
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| MPPT | Maximum Power Point Tracking |
| PV | Photovoltaic |
| Vdc | Voltage at the DC side |
| Vac | Voltage at the AC side |
| Vmpp | Voltage at the Maximum Power Point |
| Impp | Amperage at Maximum Power Point |
| AC | Alternating Current ( Form of electricity supplied by Utility Company ) |
| DC | Direct Current ( Form of electricity generated by PV modules ) |
| VDE 0126-1-1 | German standards for establishing suitability for Grid Connection of the Inverter. |
| DC Switch | Switch in the DC Circuit. Disconnects DC source from Inverter. May be integrated or external to Inverter. |